UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

Dwg

October 19, 2004

Mr. Paul Currier, P.E.
Administrator, Watershed Management Bureau
New Hampshire Department of Environmental Services
29 Hazen Drive
P.O. Box 95
Concord, NH 03302-0095

Dear Mr. Currier: Paul

Thank you for your final submittal of 20 acid impaired lake TMDLs. The U.S. Environmental Protection Agency (EPA) has determined that the 20 TMDL's meet the requirements of Section 303(d) of the Clean Water Act (CWA), and of EPA's implementing regulations (40 CFR Part 130). Enclosed is a copy of our approval documentation.

My staff and I look forward to continued cooperation with the NHDES in exercising our shared responsibility of implementing the requirements under Section 303(d) of the CWA. Please feel free to contact me or my staff if you have any questions or comments on our review.

Sincerely,

Linda M. Murphy

Linda M. Murphy, Director
Office of Ecosystem Protection

Enclosure

cc: Greg Comstock (NHDES)
Bob Estabrook (NHDES)
Margaret Foss (NHDES)

TMDL: 20 acid impaired lakes/ponds in New Hampshire
Date of Review: October 7, 2004
TMDL Reviewer: Al Basile

REVIEW ELEMENTS OF TMDLs

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. § 130 describe the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation.

1. Description of Waterbody, Pollutant of Concern, Pollutant Sources and Priority Ranking

The TMDL analytical document must identify the waterbody as it appears on the State/Tribe's 303(d) list, the pollutant of concern and the priority ranking of the waterbody. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and, (4) explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments, or chlorophyl *a* and phosphorus loadings for excess algae.

A. Description of Waterbody

The TMDL report prepared by New Hampshire, dated September 2004, includes TMDLs for 65 lakes that are impaired by acid deposition. Twenty of the 65 lakes were submitted for approval under a cover letter dated October 6, 2004. A description of each waterbody including location, surface area, maximum depth, drainage area, and elevation is included in the report.

B. Pollutant of Concern

The TMDL document identifies the pollutant of concern, acidic inputs. Acid deposition occurs when

emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) react in the atmosphere with water, oxygen and oxidants to form acidic compounds. These compounds are carried varying distances from their source and are deposited as precipitation (rain, snow), as fog or as dry particles (dust). For purposes of TMDL development, the loadings from both sulfur and nitrogen compounds were combined to derive a total allowable acidic input for each lake.

C. Pollutant Sources

The document describes the sources of acidic inputs, namely sulfuric and nitrogen compounds from atmsopheric deposition. These compounds come primarily from upwind out-of-state sources, such as industrial and fossil fuel emissions in the mid-west.

D. Priority Ranking

All of the lakes included in the TMDL report were listed on New Hampshire's 2004 303(d) list as a high priority for TMDL development.

Assessment: EPA concludes that the TMDL document satisfies the requirements of the above category.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribe water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether or not the applicable water quality standard is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, usually site specific, must be developed from a narrative criterion and a description of the process used to derive the target must be included in the submittal.

The TMDL document includes a description of the applicable water quality standards, designated uses, the numeric water quality criterion, and the antidegradation policy.

The targeted water quality goal for each of the lakes in this report is to meet the State's numeric criteria for pH (6.5 SU). For purposes of water quality modeling, a target Acid Neutralizing Capacity (ANC) value of 3.0 mg/L was found to correlate with a pH of 6.5 SU. It is generally considered that ANC values at 2.5 mg/L or above provide adequate buffering of acid inputs to protect aquatic life.

Assessment: EPA concludes that the TMDL document satisfies the requirements of the above

category.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards (40 C.F.R. § 130.2(f)). The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. § 130.2(i)). The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, this method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results from water quality modeling, etc. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation.

In many circumstances, a *critical condition* must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1)). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. *Critical conditions* are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. *Critical conditions* are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

The Steady State Water Chemistry Model (SSWC) was used to quantify the maximum amount of acidity (or critical load) that each lake could receive and still maintain an ANC value of 3.0 mg/L $CaCO_3$ and minimum pH of 6.5 SU. This model has been used widely for critical load determinations in Canada and northern Europe where acid deposition is a major problem. The SSWC model calculates critical loads (i.e., loading capacity) based on in-lake water chemistry and also accounts for annual surface runoff and a user specified ANC limit. Critical loads for each lake are presented in Table 2 of the TMDL report.

The use of the SSWC model for critical load determination has many benefits. First, the model has a successful track record in northern Europe and Canada supporting establishment of source reduction targets. Second, the inputs for the model were readily available. Third, the model has flexibility to adapt to the user-specific ANC target. This flexibility allows the direct output of the necessary critical loads without additional extrapolation.

The primary weakness of the model is that it cannot predict the timing of responses to reduced deposition. The model does not take into account future climate-based changes such as weathering

rates and soil base cation depletion which can affect the speed of lake recovery. Therefore, while the model accurately estimates critical loading limits based on current data, it cannot predict how long the recovery process may take.

The Critical Condition for these lakes occurs during springtime when annual acidity loads peak due to snowmelt runoff events. Since there was not enough data from the spring time-period to develop TMDLs for all 20 lakes, New Hampshire combined spring, summer, and fall data to determine annual average critical loads for each lake. New Hampshire acknowledges in the TMDL document that critical loads calculated using this approach may not be fully protective for the worst case conditions of springtime. To address this issue, the state added additional Margin of Safety (MOS).

Assessment: EPA concludes that the TMDL document satisfies the requirements of the above category.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 C.F.R. § 130.2(g)). Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. § 130.2(g)). Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero LA implies an allocation only to point sources will result in attainment of the applicable water quality standard, and all nonpoint and background sources will be removed.

The load allocations are presented in Table 3 of the TMDL report. Load allocations were determined by subtracting an explicit 7.5% Margin of Safety from the critical load for each lake.

Assessment: EPA concludes that the TMDL document satisfies the requirements of the above category.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources (40 C.F.R. § 130.2(h)). If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero WLA implies an allocation only to

nonpoint sources and background will result in attainment of the applicable water quality standard, and all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. But it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. In such cases, the State/Tribe will need to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

Since the source of the acidity is atmospheric deposition, a nonpoint source, wasteload allocations (WLA's) were set equal to zero.

Assessment: EPA concludes that the TMDL document satisfies the requirements of the above category.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)). EPA guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

The TMDLs provided in this document include a 7.5% margin of safety (MOS). The rationale provided by New Hampshire DES is as follows: "In 2003, Vermont conducted a similar TMDL study for its acid ponds and used a 5% margin of safety based on the fact that most of the data was current (5 years or less old) and site specific. This TMDL also used site specific data but some of the data was greater than 5 years old and some summer data was used, which may be less protective than spring time data. For these reasons, a slightly higher margin of safety (7.5%) was used for this TMDL."

Given model variability and the fact that springtime data was not exclusively used to determine critical loads, EPA would have preferred that the margin of safety was greater. However, based on the information that is currently available, EPA believes that the MOS is adequate. The TMDL can and should be reevaluated as new information becomes available. The TMDL's included in this

document, when combined with a similar study conducted in Vermont, provide estimates that support the need for further reductions in atmospheric loading to the New England region. As progress is made in reducing atmospheric deposition, the lakes will be monitored and will not be considered in full support of aquatic life uses until a pH consistent with the State's water quality standards is attained.

Assessment: EPA concludes that the TMDL document satisfies the requirements of the above category.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for including seasonal variations in the TMDL must be described (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)).

According to the New Hampshire DES, the TMDLs in this report were developed to be protective during all seasons. Since data from the critical time-period (spring) was combined with summer and fall data to obtain critical loading estimates, New Hampshire DES has added additional margin of safety (2.5%) which they believe is adequate to ensure that water quality standards will be met during all seasons, including springtime.

Assessment: EPA concludes that the TMDL document satisfies the requirements of the above category.

8. Monitoring Plan for TMDLs Developed Under the Phased Approach

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan when a TMDL is developed under the phased approach. The guidance recommends that a TMDL developed under the phased approach also should provide assurances that nonpoint source controls will achieve expected load reductions. The phased approach is appropriate when a TMDL involves both point and nonpoint sources and the point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. EPA's guidance provides that a TMDL developed under the phased approach should include a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of water quality standards.

A monitoring plan is provided in the TMDL report.

9. Implementation Plans

On August 8, 1997, Bob Perciasepe (EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To this end, the memorandum asks that Regions assist States/Tribes in developing implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by EPA, they help establish the basis for EPA's approval of TMDLs.

An implementation plan is provided in the TMDL report.

10. Reasonable Assurances

EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

In a water impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required in order for a TMDL to be approvable. However, for such nonpoint source-only waters, States/Tribes are strongly encouraged to provide reasonable assurances regarding achievement of load allocations in the implementation plans described in section 9, above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in State/Tribe implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

As these are nonpoint source TMDLs, reasonable assurance is not required.

11. Public Participation

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each State/Tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 C.F.R. § 130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must

describe the State/Tribe's public participation process, including a summary of significant comments and the State/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. § 130.7(d)(2)).

Inadequate public participation could be a basis for disapproving a TMDL; however, where EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

In addition to a 30-day public comment period posted on the State's website, emails were sent to members and active participants on the DES Water Quality Standards Advisory Committee (WQSAC) notifying them of the opportunity to comment on the draft TMDL. The WQSAC and nonmembers who regularly attend meetings include representatives from more than 2 dozen agencies/organizations.

Assessment: EPA concludes that the TMDL document satisfies the requirements of the above category.

12. Submittal Letter

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a *technical review* or is a *final submittal*. Each final TMDL submitted to EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the waterbody, the pollutant(s) of concern, and the priority ranking of the waterbody.

A submittal letter was included with the TMDL document.

13. Other Comments: